



# A Survey Website Designed for the Older People – A Case Study of Happy Life Survey

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**Abstract.** The aging problem in Greater China Region is becoming increasingly serious, and the main users of computers have expanded from the young to the elderly. However, most of the interface designs on the market are designed to fulfill the needs of young people, and there is very little research on senior user-friendly interface design especially for online survey. 「Happy Life Survey」 is a responsive online survey website designed for the older people, being accessible via smartphones, tablets, and computers. The website design is created for a user-friendly experience for the older people and in consideration of commercial viability and technical feasibility. Through the case study, this paper studies and analyzes the operational characteristics and user experience of the senior-friendly online survey.

The result of this study provided four major UX problems for older people including eyesight, hand gesture, cognition and memory, digital ability in terms of online survey operation. To resolve these issues, a new design of the system was created with three iterations. The system was tested and used in a public survey of about 36 thousand of older users. The result of this study contributes to the design of the senior-friendly online survey and increases the understanding of older user experience.

**Keywords:** Older people · Online survey · User experience · Survey design

## 1 Introduction

Greater China Region is a rapidly aging society. The aging population in Taiwan is becoming increasingly serious. The United States Census Bureau estimates that the number of people over 65 years old has reached 600 million in 2017, accounting for 8.5% of the world population. An estimated 17% growth is expected by 2050. The United Nations' global population aging report predicts that people over 60 years old will rise up to 44% of Taiwan's population by 2050, which will become the highest percentage in the world. Nowadays, the target users of high technology spreading from the young to the elderly. However, most of the interface designs of products on the market are designed to satisfy the needs of young people and often neglects friendly interface design for older people. Many operational problems are found on smartphones, tablets, and computers, such as confusing abstract icons, interface information complexity, and so on. Zhou Beizhen (2009) pointed out that the decline of physical and cognitive abilities makes the learning process of operating technological products

difficult for them, consequently resulting in decreased learning intention or even rejection. Online surveys are flourishing nowadays, but only a few websites and applications are designed specifically for the elderly, thus limiting their rights to express opinions use online surveys.

Stans Foundation Chinese Consumer Center (CCC) focuses on researching the daily needs of older people in the Greater China. Through a senior-friendly online survey design system, this research and CCC hope to attract older people to participate in the survey. The results collected from the survey will ultimately provide suggestions for the government or relevant industries and insights on the needs of older people in Taiwan, helping to build welfare strategies and product services for them. This multi-disciplinary collaboration project, Happy Life Survey, had members from design, business, and technology, looking for innovative output.

The case study of “Happy Life Survey” emphasizes on the user experience of the online survey and focuses on studying the problematic experiences of the interface of online surveys. With literature review, online survey analysis and experience gathered from the operational behavior of the older people, this research explores the design strategy, the operating characteristics for the older people, and help to establish a new version of a senior-friendly online survey system.

## 2 Literature Review

### 2.1 The Older People Research

**The Middle-ager and the Elder.** The WTO defines ‘elder’ as being over 65 years of age. According to the Plan on Promoting the Job Redesign among Middle-agers promulgated by the Ministry of Labor of Taiwan in 2015, the ‘elder’ is defined as nationals aged over 65, while the ‘middle-ager’ is defined as nationals aged from 45 to 65. In the international arena, the categorization and definition of old age are all different. Zhang Yuhua (1989) also claimed that there is no single standard for “old”, which is linked to many aspects. Older people in this paper refer to the middle-aged and people aged 50 and above. By inviting them to participate in the survey, we attempt to understand the needs and demands of these older people who are about to enter or have already entered the old age.

**Visual and Cognitive Mechanism of the Older People.** Shi Yiru (2009) claimed that the ordinary people experience the gradual decline of visual acuity at around 40-45 years of age. The focusing ability required for seeing close objects has gradually diminished the ability to adjust the distance to the objects decreases, and errors appear gradually in the phototaxis process needed to see objects. Adequate focusing becomes difficult, and visual acuity worsens. In addition, the dynamic images captured by the older people are not as clear as they were when they were young. Their sensation of light and shade diminishes, and their color perception and contrast sensitivity also decrease accordingly. Hawthorn (2000) pointed out that the degradation of vision is the most common factor affecting older people’s operation of products. Regarding the operation of the online survey, vision is the main channel for receiving information.

Therefore, how to reduce the problems in use caused by vision deterioration of older people via the visual and other media and thereby enhance their experience of online survey operation is one of the major design considerations of this project.

Guo Chenjia (2001) pointed out that the deterioration of visual and cognitive functions in the older people is an important factor affecting their operation of products. After receiving the information, the older people pass it to the brain to generate cognition. Affected by aging, declining execution speed, and other factors, the cognitive abilities of the older people also deteriorate. Attention, discernment, reasoning, memory, and comprehension all begin to decline, leading to difficulties in their operation of products. Moreover, compared to the ordinary operations, the online survey involves more complicated information cognitions and operational interactions, such as understanding the questions in the survey, the logical relationship of the survey and the text input, which are more likely to cause filling-out obstacles among the older people, thereby affecting their experience of using online survey. Hence, how to help the older people deal with the problems resulting from cognitive decline to better complete the online survey is also an important design consideration of this project.

## 2.2 Online Survey Analysis

**Online Survey and Other Survey.** During the twentieth century, there were great advances in the techniques and technologies utilized in survey research, from systematic sampling methods to enhanced survey design and computerized data analysis. The field of survey research became much more scientific, and several leading associations emerged to further enhance industry practices. Technology has revolutionized the way in which surveys are administered – with the advent of the first e-mail surveys in the 1980s and the initial web-based surveys in the 1990s (Schonlau et al., 2001). Joel R. Evans and Anil Mathur (2005) had a detailed description of the advantages and potential disadvantages of the online survey. If done properly, online surveys have significant advantages over other formats. However, it is imperative that the potential weaknesses of online surveys be mitigated and that online surveys only be used when appropriate. In addition, there are three main types of surveys: mail survey, personal survey, telephone survey. According to Joel R. Evans and Anil Mathur (2005)'s research, comparing the advantages and potential disadvantages of the online survey with these three survey methods, as shown in Table 1.

To summarize, in order to reduce the difficulties found within the online survey and consider the particularity of the target group, this campaign simultaneously carries out an online and offline survey. Samples have been enhanced to help the older people with weak digital abilities to smoothly operate each step of the webpage. Therefore, while reducing their operational concerns, this research is also able to gather more information about the older people.

**Survey Cake Online Survey System.** The research uses Survey Cake, a free online survey platform, to customize the official online survey system. Survey Cake system is used because Taiwan 25sprout Company is willing to cooperate with the research by carrying out case studies and providing technical support. Survey Cake online survey

**Table 1.** The advantages and disadvantages of the main survey formats.

	Advantages	Disadvantages
Online survey	Global reach; B-to-B and B-to-C appeal; Flexibility.; Technological innovations; Convenience; Ease of data entry and analysis. Question diversity; Low administration cost; Ease of follow-up; Controlled sampling; Large sample easy to obtain; Control of answer order; Required completion of answers; Go to capabilities; Knowledge of respondent vs. nonrespondent characteristics	Perception as junk mail; Skewed attributes of internet population: upscale, male, etc.; Questions about sample selection (representativeness) and implementation; Respondent lack of online experience/expertise; Technological variations; Unclear answering instructions; Impersonal. Privacy and security issues; Low response rate
Mail survey	The ability to use a large sample; the geographic coverage; the lack of interviewer bias; less respondent time pressure; the variety of questions that may be asked; possible respondent anonymity; and the low cost per respondent relative to personal surveys	The time needed for a company to receive all responses; the high non-response rate; unclear instructions; the tendency for some item non-responses – where answers are left blank; incomplete answers; brief answers to open-ended questions; an impersonal approach; and respondent ability to control the order in which questions are answered
Personal survey	Personal interaction; clear instructions; question variety; flexibility and adaptability; use of probing techniques; ability to use physical stimuli; capability to observe respondents; and control over the survey environment	Interviewer bias; costs per respondent; limited sample size; geographic limitations; convenience sampling with questionable response rates (such as mall surveys); respondent time pressure; and the difficulty in getting demographics
Telephone survey	The possibility of random sampling; good geographic coverage, cost savings from centralized phone banks and discount calling providers; control over the survey process; timeliness and completion speed, personal interaction; and technological enhancements for interviewers that ease data entry and reduce errors	Interviewer bias; the refusal of many of people – leading to low response rates and non-representative samples; the need to be brief; a lack of respondent trust – often related to the unseen nature of interviewers; and an inability to use visual aids

system has more than ten types of questions format and about twenty professional functions. It provides rich samples of surveys, such as customer satisfaction, market research, and so on. Moreover, results are shown through clear and interactive graphs with advanced features, like exporting results to Excel and SPSS or switch results to

different chart display. However, from the pilot test conducted on the recruited old-ages people, eleven usability problems and operation characteristics were found. Therefore, the survey system will be customized according to the design optimization.

### 2.3 User-Friendly Website Design for the Older People

Previous literature on elder-friendly website design has contributed to the understanding of this research, and more importantly, new contributions are made to enhance and produce innovative results. Andrew Arch (2008) summed up the literature regarding website design for the older adults from the year 1999 to 2008. Some of these are driven by theory in academia, while others come from the web industry and practical experience. Examples of experiences derive from the search engine, navigation, and e-Services influence the operation of the elderly. There is no literature related to the older people about online survey research. However, among past literature, the most relevant information found is the format of the surveys. Line and her colleagues (Lines, Patel and Hones, 2004; Lines et al., 2006; Lines, Ikechi and Hones, 2007) proposed seven guidelines related to form design and expanded six requirements with the initial requirements as shown below in Table 2.

**Table 2.** Guidelines related to form design.

First study	
1. Form layout	Extra space between questions and answer boxes (not confirmed in the second study)
2. Simplified question structure	To avoid creating ‘excessive’ cognitive loads
3. Question completion assistance	Pop-up messages and/or hyperlinked context-sensitive help with each appropriate questions
4. Additional information	Including a list at the top of what information will be required to complete the form
5. Data entry	Automatic checking and validation during completion
6. Form personalization	Presenting only those questions appropriate to the users, e.g. a widow should not be asked for information about her spouse
7. Form submission	Online submission will be easy for many mobility impaired elderly people and may lead to quicker processing time
Second Study	
1. Bullet point instructions	Easier to read than paragraph text
2. Logical information groupings	To ensure that the user does not need to go back-and-forth within a form
3. Justification for personal/sensitive questions	The participants resented providing some information for no apparent good reason
4. Security information	How could the users be sure their data would remain confidential?
5. Help and assistance feature	This second study suggested a ‘formal’ help page in addition to the pop-up and/or hyperlinks suggested previously
6. Save and return	An advantage of paper-based forms is that you can put them down and finish completing them later; this was requested by users for online forms

There are many literature studies on the operation experience and the use of different digital devices for the older people. However, there has been no research done on the online survey for the old-aged people using different digital devices. This research is based on the information gathering and results from the relevant literature, the exploration and the improvement of the study of this field.

### 3 Case Study: Happy Life Survey for the Older People

#### 3.1 Research Method

The purpose of this case is to help older people successfully complete online survey. Through the case study method, this research explores the user experience of online survey for the elderly. Yin (2003) pointed out that the case study consists of four important stages: narration, exploration, hypothesis verification and interpretation. The content of the study is shown in Table 3.

**Table 3.** Research stage

Stage	Task	Content
Narration	Narrate question	Nowadays, older people endure bad experiences when they answer online surveys
Exploration	Empirical evidence	Through literature review, survey analysis and practical operation experience, this case studies and explores design strategy and mainly focuses on usability problem and user operation characteristics
Hypothesis verification	Demonstration	The hypotheses proposed for the design phase are verified during the study and testing stage
Interpretation	Analysis	Iterative test hypothesis, analyzing the results from the observations

#### 3.2 Case Introduction

CCC focuses on researching the daily needs of older people in the Greater China. Through an elder-friendly online survey design system, this research aims to attract older people to participate in the survey. This case balances the restrictions of desirability, viability, and feasibility, producing the most innovative design for the older people, yet also meeting the needs of a wide age range of people. CCC is sponsoring and business marketing research center. Design Information and Thinking Lab is responsible for user Design. 25sprout Company and Cyberon Corporation are responsible for the technical support, the survey system and the Voice Output function. It is a responsive online survey website accessible on smartphones, tablets, and computers. Due to the server design challenges of smartphone operators, this paper uses the smartphone as the main device. The research, design and official website and the launch of this project are spanned from March to August of 2017. The online surveys and the 30 offline field tests were carried out simultaneously in Taiwan. The field tests

contacted about 1,024 older people. As of October 18, a total of 79,441 responses from older people were collected, 36,032 respondents were over 50 years old and 2,042 respondents over the age of 75 years.

### 3.3 Target User Research and Insight

From data analysis and test observations, the design team discovered that the degree of physiological aging, cognitive competence and digital literacy are the most crucial dimensions in measuring the smoothness of the operation. In order to solve the usability problem of older people, the testers were classified into three types of digital literacy: low digital literacy, medium digital literacy, and high digital literacy. These criteria derive from the 33 participants of this research, based on their degree of physical age and cognitive competence. The purpose is to provide design strategy for the design, thus this standard, as reference only, does not have other applicability. The standard definition of physiological aging is the ability to see the interface information clearly, to hear the voice playback clearly, and to complete the hand operation accurately. Meanwhile, the standard definition of cognitive competence is the ability to recognize and understand the contents of the survey. The older people who can meet these criteria were then further divided into different target groups according to the operational experience, learning ability, and operating attitude, as shown in Table 4.

**Table 4.** Three types of digital literacy

	Low digital literacy	Medium digital literacy	High digital literacy
Operational experience	1. The use individual functions from a single device and the use of only the basic level software 2. They cannot solve operational problems by themselves	1. Use main functions of one or more devices and use the advanced degree of the software 2. They try and solve most operational problems	1. The most used functions of many devices and the use of high degree software 2. They can solve most problems through empirical reasoning
Learning ability	Need to learn new skills in the use of digital devices for more than 3 times	Need to learn new skills in the use of digital devices for 1 or 2 times	Quickly learns new skills in digital devices
Operating attitude	Not used to operating the digital device	Neither rejecting nor very confident in the operation of digital devices	Confidence in the operation of digital devices

Based on the recruited subjects’ everyday usage of digital device functions, the design team roughly rated the older people’s digital literacy corresponding to the operational difficulty of these functions. The basic functions frequently used by the older people with low digital literacy includes making phone calls, sending text

messages, taking pictures and using search inputs. The older people with medium digital literacy can also make frequent use of advanced functions like finding information, downloading and playing videos or music, using social networking software and playing simple games. As for older people with high digital literacy, aside from the functions used by the former two groups, they also use high-end features such as online forums, sending and receiving e-mails, cloud resource management, and online shopping.

Appropriate design strategies are implemented adapting to the classification of these three groups. The present survey website offers intuitive operation and pleasant design to older people with all three levels of digital literacy. Moreover, for older people with medium digital literacy, an easy-to-operate system, valid prompts and voice assistance are also needed. Finally, there is insufficient time for the older people with low digital literacy to digest their learning, thus the most effective solution would be assisted operation by presenting a one-time submission survey.

By testing and observing the operational behaviors of the older people, it is found that older people in three groups could be classified according to the digital ability. They present the following characteristic issues: **(1) Poor eyesight.** They require larger size fonts when reading; smaller font size or insufficient contrast between the text and the background can reduce readability. **(2) Hand gesture.** The habit of rushing, repeating and rage clicks until a response occurs; trouble hitting interface targets due to limited motor control; finger remains too long or difficult to click accurately. **(3) Cognitive decline and memory limitation.** Having a hard time reading and remembering too much content at a time; weak learning ability for things that they have not experienced before; can easily be disturbed by information unrelated to the operation in a page; memorize forms and steps by rote memorization because they do not understand the operation principle of digital products. **(4) Weak digital ability.** Compared with young people, some of the older people cannot use the advanced function or complex operation, do not understand the meaning of the generic symbols and icons on the internet, do not know that they can browse more information by sliding the page, and moreover, they have difficulties in typing. According to the problems found in the pilot test from the former survey system, the research preceded multiple iterations of the user experience design and test. The research process is shown in Fig. 1.

### 3.4 User Experience Design

The design of this online survey website has experienced three iterations. In the first stage, the design team attempts to solve the problems based on the usability problems found in the pilot test, as shown in Table 5.

### 3.5 User Experience Test

Following two iterative tests and final test, the first stage design was verified and improved for the official online survey website. Details are described as follows.

**Design of Poor Eyesight.** The system uses Voice Output function. The survey offers Voice Output in three languages (Mandarin, Taiwanese, and Hakka dialect) to assist



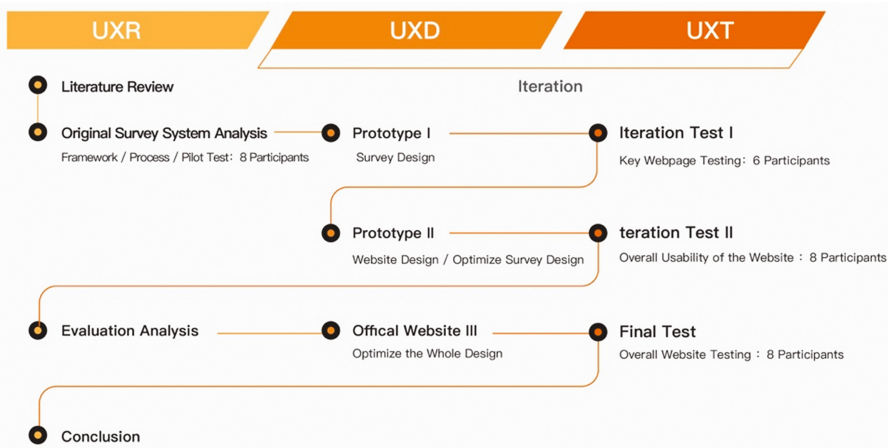


Fig. 1. UX research process

older people with poor vision or poor literacy. The test found out that most of the older people did not actively click this button when they were filling in the survey; moreover, they operated through their vision.

**Design of Cognitive Decline and Memory Limitations.** 1. Although the button was clickable, older people often clicked the small checkbox in the edge of the button. It might cause by their written experience of check-signs from paper surveys, so an enlarge checkbox has been provided for them to check. 2. Improved Stage Reminder web pages were added. Considering the number of questions and the variety of the types of questions presented in the survey, we speculated that older people might get lost or impatient in the process of a survey, so reminders throughout the survey were added to help the users to know the progress and to encourage them to finish. We revised these five reminder pages and made the progress and content clear.

Table 5. Characteristic issues and design

Characteristic issues	Design
Design of poor eyesight	1. Sharp color contrast and larger font size can help the older people easily visit website information
	2. The survey follows the consistent principle so that there is a uniform use pattern for the older people
Design of hand gesture	1. To complete the survey process, clicking and sliding are two simple gestures to replace long presses, dragging and other non-intuitive gestures
	2. Keeping enough distance in the area of input, option, and button to minimize false contacts
	3. The modified size of the button is suitable for older people to click on

(continued)

**Table 5.** (continued)

Characteristic issues	Design
Design of cognitive decline and memory limitation	1. To reduce older people from sliding back and forth, the title is locked in place using a floating-table-header
	2. Encourage webpage helps older people understand the location of the survey. (modification after the test)
	3. The survey follows the consistent principle so that there is a uniform pattern for the older people
	4. Reduce the interference when older people are operating, such as clickable advertising that jumps out of the survey
	5. Require title and life problem title to compromise between cognitive load and frequent operations for older people
	6. Survey answering mechanism is designed such that older people can only click on the next page button at the bottom of the page after making selections or inputs upon browsing all the contents on the page, so as to prevent the answering without browsing complete information
Design of weak digital ability	1. Replace abstract icons or symbols with clear, understanding words
	2. Reduce typing and adding hint for input web pages, like "Click here to type" in input box; the corresponding keyboard will be provided based on their required information input (e.g. character, numbers)
	3. To provide clear error tips to help older people smoothly fill in the survey in time
	4. To provide a friendly-reminder to slide downward in long web pages (modification after the test)
	5. To provide webpage operating tutorial to help older people learn how to operate (modification after the test).

The test found that the pages would cause some older people to try to click on the reminder box, leading them to stay on the webpage for a long time. Finally, the final version of the reminder design was simplified as one page, only using color to remind them the progress. The final version did help the older people generally feel that the survey would be less time consuming and thus could be finished without fatigue.

**Design of Weak Digital Ability.** 1. On the long page with more than one screen, the reminder for sliding down "More to Read downward slide" was changed to "After finishing, press the next page button to continue." The test found that the original design could be confusing for older people after selecting the answer, and did not know how to continue. As a result, they would try to click the reminder bar, so a more detailed words description was provided for clear reminding.

2. The Operation Instruction page was removed. In the first stage of prototype design, the design team assumed that the operation instruction can assist older people

with weaker technological capability in learning how to fill out the survey. The first version of the operation instruction presented animations before each question. However, the test found out that the older people would either operate on the page following the instructions or unable to understand the instructions due to inability to keep up with the speed of play.

Therefore, the operation instruction was optimized: (1) Dark gray area was added on both sides of the page to separate from the page contents, thus clearly informing its difference from the previous content. (2) Elders were allowed to skip the page quickly. (3) For older people who wanted to browse the instruction, apparent visual guidance was added, such as dividing instruction steps and slowing down the playing speed. Verification of the second version of design found that most of the older people were able to complete the operation smoothly, so the necessity of instruction was reduced. Older people unable to understand the instructions could also continue the survey by skipping the questions. Therefore, we decided to remove the operation instruction.

The revision process made the design team know that the mini animation mode of instruction was inappropriate for the older people who had never used online survey before. Older people with lower digital literacy were unable to learn about the operation by only watching animations in such a short time. However, we assume that the mini animation mode of instruction is suitable in the cases where older people need to use online survey frequently and have time for comprehension.

After six experts evaluated the usability problems of the original survey system and three iteration tests from the 30 participants, the design has been optimized and finalized. Comparing the scores of the original and the final online surveys, we found that the SUS usability scale scores rose from 79.06 to 86.56, and NPS scores rose from 37.5 to 100. This indicates that the redesigned survey has greatly improved usability, moreover, the applicability of research results has also been ensured to some extent.



Fig. 2. Design features

## 4 Conclusion

In summary, this research might have the largest number of participants in the online survey for the older people. It showed that the user experience design has an important role in online survey or the senior. The study found out that, older people suffered from four types of common user experience problems: vision, hand gesture, cognition and memory limitation, or digital ability. In this study, design features were provided to resolve these four issues. After iterative tests, an elder-friendly online survey was designed. The design features of this case include: (1). Try to use Voice Output function to help older people fill in the survey. (2). Continue older people's written experience from the paper survey. (3). Try to use Stage Reminder and Operation Instruction page. The design features are shown in Fig. 2.

Moreover, this design was the first online survey using Voice Output to help older people fill in the online survey. How to use hearing assisting technologies to help the older people could be our future studies.

**Acknowledgments.** The authors would like to thank the DITL design members who participated in the program.

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